CLAIMS

1. Sm-Fe-N based magnetic powder, wherein the Sm-Fe-N based alloy powder has an average particle size in a range of 0.5 to 10 μm, and an average degree of needle shape of not less than 75%, said average degree of needle shape being represented by an average value of number of particles obtained by the following equation:

$$\text{Degree of needle shape} = (\mathbf{b}/\mathbf{a}) \times 100\ (\%)$$

where **a** represents the longest diameter on a projection image of a particle, and **b** represents the largest diameter vertical to the **a** of the particle.

2. Sm-Fe-N based magnetic powder, wherein the Sm-Fe-N based alloy powder has an average particle size in a range of 0.5 to 10 μm, and an average degree of roundness of not less than 78%, said average degree of roundness being represented by the average value of number of particles obtained by the following equation:

$$\text{Degree of roundness} = (4\pi S/L^2) \times 100\ (\%)$$

where S and L represent an area of particle projection and a peripheral length of the outline of a particle image, respectively.

3. Sm-Fe-N based alloy powder according to claim 1, wherein the alloy powder has the average particle size in a range of 0.6 to 10 μm, the average degree of needle shape of

not less than 80%, a coercive force of not less than 12.5 kOe and a residual magnetization of not less than 100 emu/g.

4. Sm-Fe-N based alloy powder according to claim 1, wherein the alloy powder has the average particle size in a range of 0.6 to 10 μm and the average degree of needle shape of not less than 85%, a coercive force of not less than 15 kOe and a residual magnetization of not less than 125 emu/g.

5. Sm-Fe-N based alloy powder according to claim 1, wherein the alloy powder has the average particle size in a range of 0.6 to 10 μm, the average degree of needle shape of not less than 90%, a coercive force of not less than 17 kOe and a residual magnetization of not less than 130 emu/g.

6. Sm-Fe-N based alloy powder according to claim 2, wherein the alloy powder has the average particle size in a range of 0.6 to 10 μm and the average degree of roundness of not less than 80%, a coercive force of not less than 10.8 kOe and a residual magnetization of not less than 94 emu/g.

7. Sm-Fe-N based alloy powder according to claim 2, wherein the alloy powder has the average particle size in a range of 0.6 to 10 μm, the average degree of roundness of not less than 85%, a coercive force of not less than 15.5 kOe and a residual magnetization of not less than 115 emu/g.

8. Sm-Fe-N based alloy powder according to claim 2, wherein the alloy powder has the average particle size in a range of 0.6 to 10 μm, the average degree of roundness of not

less than 90%, a coercive force of not less than 18.4 kOe and a residual magnetization of not less than 140 emu/g.

9. A process of producing Sm-Fe-N based alloy powder comprising:

allowing a precipitate containing Sm and Fe to co-precipitate from a solution dissolving Sm and Fe;

calcining the precipitate to form metal oxide;

reducing and diffusing the resulting metal oxide powder mixed with a metal reducing agent into Sm-Fe alloy powder; and

nitriding the alloy powder to obtain said Sm-Fe-N based alloy powder.

10. The process of producing Sm-Fe-N based alloy powder according to claim 9, wherein said precipitate has a sharp particle size distribution and a spherical particle shape, and Sm and Fe are uniformly distributed in each particle.

11. The process of producing Sm-Fe-N based alloy powder according to claim 9, the process further comprising heating said metal oxide formed by calcining the precipitate at a temperature in a range of 300 to 900°C in a reducing gas to reduce all or part of the iron oxide into metal iron previously, wherein the metal oxide powder that has been preliminarily reduced is subjected to the reduction-diffusion process.

12. A process of producing Sm-Fe-N based alloy powder,

the process comprising:

heating mixed powder containing Sm_2O_3 having an average particle size of less than 5 μm and an iron oxide having an average particle size of less than 2 μm at a temperature in a range of 300 to 900°C in a reducing gas to preliminary reducing all or part of the iron oxide is preliminarily into metal iron; and

subjecting to the reduction-diffusion step the mixture of the preliminarily reduced powder with metal Ca or calcium hydride CaH.